

1. A method of calibrating rise times in a pulse generating system, comprising:
 - measuring a first average voltage of the first test waveform;
 - calculating a first peak voltage of the first test waveform;
 - 5 measuring a second average voltage of the second test waveform;
 - calculating a second peak voltage of the second test waveform;
 - using the first peak voltage and the second peak voltage, calculating the rate of change of voltage in a rising portion of the waveform;
 - normalizing the rate of change of voltage to a value representative of a
 - 10 definition of rise time to obtain a rise time calibration point.
2. The method of claim 1, wherein the first test waveform and the second test waveform have fall times that are insignificant with respect to the first pulse width and the second pulse width, respectively.
3. The method of claim 1, wherein the first test waveform and the second test waveform may have any shape capable of being adequately represented mathematically.
4. The method of claim 1, wherein any number of rise times may be calculated by repeated application of the procedure.
5. The method of claim 1, wherein performing the method at any time to obtain more updated rise time calibration points.
6. The method of claim 1, further comprising:
 - generating one or more rise time calibration points;
 - storing the one or more rise time calibration points; and
 - when a different rise time is required using the one or more rise time
 - 5 calibration points to generate the different rise time.

7. The method of claim 1, wherein the method nullifies one or more adverse effects of rise time errors due to environmental variations and component aging.

8. The method of claim 1, further comprising:

configuring a pulse generator to output the first test waveform, of first pulse width and a known pulse period; and

5 configuring the pulse generator to output the second test waveform, of second pulse width and the pulse period.

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9. A method of calibrating fall times in a pulse generating system, comprising:

measuring a first average voltage of the first test waveform;

calculating a first peak voltage of the first test waveform;

5 measuring a second average voltage of the second test waveform;

calculating a second peak voltage of the second test waveform;

using the first peak voltage and the second peak voltage, calculating the rate of change of voltage in a falling portion of the waveform; and

normalizing the rate of change of voltage to a value representative of a

10 definition of fall time to obtain a fall time calibration point.

10. The method of claim 9, wherein the first test waveform and the second test waveform have rise times that are insignificant with respect to the first pulse width and the second pulse width, respectively.

11. The method of claim 9, wherein the first test waveform and the second test waveform may have any shape capable of being adequately represented mathematically.

12. The method of claim 9, wherein any number of fall times may be calculated by repeated application of the procedure.

13. The method of claim 9, wherein performing the method at any time to obtain more updated fall time calibration points.

14. The method of claim 9, further comprising:

generating one or more fall time calibration points;

storing the one or more fall time calibration points; and

when a different fall time is required using the one or more fall time

5 calibration points to generate the different fall time.

15. The method of claim 9, wherein the method nullifies one or more adverse effects of fall time errors due to environmental variations and component aging.

16. The method of claim 9, further comprising:

configuring a pulse generator to output the first test waveform, of first pulse width and a known pulse period; and

5 configuring the pulse generator to output the second test waveform, of second pulse width and the pulse period.

17. A method allowing for independent calibration of rise and fall times in a pulse generating system, comprising:

measuring a first average voltage of a first waveform;

calculating a first peak voltage of the first waveform;

5 measuring a second average voltage of a second waveform;

calculating a second peak voltage of the second waveform;

using the first peak voltage and the second peak voltage to calculate a first rate of change of voltage in a rising portion of the waveform;

normalizing the first rate of change of voltage to a value representative

10 of a definition of rise time to obtain a rise time calibration point;

measuring a third average voltage of a third waveform;

calculating a third peak voltage of the third waveform;

measuring a forth average voltage of a forth waveform;

calculating a forth peak voltage of the forth waveform;

15 calculating the fall time;

using the third peak voltage and the forth peak voltage to calculate a second rate of change of voltage in a falling portion of the waveform; and

normalizing the second rate of change of voltage to a value representative of a definition of fall time to obtain a fall time calibration point.

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18. A system capable of performing rise time calibrations, comprising:
- a pulse generator which accepts digital inputs and outputs analog pulses;
 - a rise time circuit capable of modifying the rise time of an analog input
5 received from the pulse generator;
 - a lowpass filter coupled to the rise time circuit;
 - a conversion device coupled to the lowpass filter for converting analog to digital;
 - a controller capable of accepting digital inputs and supplying digital
10 outputs, which is capable of mathematical computations; and
 - an interface circuit between the controller and the rise time circuit;
- wherein the lowpass filter generates an average voltage of a waveform produced by the pulse generator and having a rise time supplied by the rise time circuit; wherein the controller calculates a rise time calibration point of the
15 waveform from the average voltage of the waveform and a mathematical description of the waveform; and wherein the controller is operable to control the rise time circuit to change the rise time of the waveform in accordance with the rise time calibration point.
19. The system of claim 18, wherein the system is mounted in one host device.

20. The system of claim 18, wherein the system is not all mounted in one host device.

21. The system of claim 18, wherein the rise time circuit comprises one or more of current sources, pulse width modulators, variable resistance elements, variable capacitance elements, digital devices, analog to digital converters, and digital to analog converters.

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22. The system of claim 18, wherein the lowpass filter comprises passive or active components.

23. The system of claim 18, wherein the conversion device comprises one or more of analog to digital converters, digital to analog converters, current sources, variable resistance elements, variable capacitive elements, and active and passive components.

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24. The system of claim 18, wherein the controller comprises a processor.

25. The system of claim 18, wherein the controller is capable of storing and manipulating rise time calibration data.

26. The system of claim 18, wherein the interface circuit comprises one or more of digital to analog converters, analog to digital converters, current sources, variable resistance elements, and variable capacitive elements.

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27. A system capable of performing fall time calibrations, comprising:
a pulse generator which accepts digital inputs and outputs analog pulses;

a fall time circuit capable of modifying the fall time of an analog input
5 received from the pulse generator;

an lowpass filter coupled to the fall time circuit;

a conversion device coupled to the lowpass filter for converting analog
to digital;

a controller capable of accepting digital inputs and supplying digital
10 outputs, which is capable of mathematical computations; and

an interface circuit between the controller and the fall time circuit;

wherein the lowpass filter generates an average voltage of a waveform
produced by the pulse generator and having a fall time supplied by the fall
time circuit; wherein the controller calculates a fall time calibration point of the
15 waveform from the average voltage of the waveform and a mathematical
description of the waveform; and wherein the controller is operable to control
the fall time circuit to change the fall time of the waveform in accordance with
the fall time calibration point.

28. The system of claim 27, wherein the system is mounted in one host
device.

29. The system of claim 27, wherein the system is not all mounted in one
host device.

30. The system of claim 27, wherein the fall time circuit comprises one or
more current sources, pulse width modulators, variable resistance elements,
variable capacitance elements, digital devices, analog to digital converters,
and digital to analog converters.

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31. The system of claim 27, further comprising:

wherein the lowpass filter comprises passive or active components.

32. The system of claim 27, wherein the conversion device comprises one or more analog to digital converters, digital to analog converters, current sources, variable resistance elements, variable capacitive elements, and active and passive components.

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33. The system of claim 27, wherein the controller comprises a processor.

34. The system of claim 27, wherein the controller is capable of storing and manipulating fall time calibration data.

35. The system of claim 27, wherein the interface circuit comprises one or more digital to analog converters, analog to digital converters, current sources, variable resistance elements, and variable capacitive elements.

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36. A system capable of performing rise time and fall time calibrations, comprising:

a pulse generator which accepts digital inputs and outputs analog pulses;

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a rise time circuit capable of modifying the rise time of an analog input received from the pulse generator;

a fall time circuit capable of modifying the fall time of an analog input received from the pulse generator;

a lowpass filter coupled to the rise time and fall time circuits;

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a conversion device coupled to the lowpass filter for converting analog to digital;

a controller capable of accepting digital inputs and supplying digital outputs, which is capable of mathematical computations;

a first interface circuit between the controller and the rise time circuit;

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a second interface circuit between the controller and the fall time circuit;

wherein to measure fall times the lowpass filter generates an average voltage of a first waveform produced by the pulse generator and having a fall time supplied by the fall time circuit; wherein the controller calculates a fall time calibration point of the first waveform from the average voltage of the first waveform and calculates the peak voltage of the first waveform from a mathematical description of the first waveform, and wherein the controller is operable to control the fall time circuit to change the fall time of a first future waveform in accordance with the fall time calibration point; and

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wherein to measure rise times the lowpass filter generates an average voltage of a second waveform produced by the pulse generator and having a rise time supplied by the rise time circuit; wherein the controller calculates a rise time calibration point of the second waveform from the average voltage of the second waveform and calculates the peak voltage of the second waveform from a mathematical description of the second waveform, and wherein the controller is operable to control the rise time circuit to change the rise time of a second future waveform in accordance with the rise time calibration point.

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37. The system of claim 36, wherein the system is mounted in one host device.

38. The system of claim 36, wherein the system is not all mounted in one host device.

39. The system of claim 36, wherein the fall time circuit comprises one or more current sources, pulse width modulators, variable resistance elements, variable capacitance elements, digital devices, analog to digital converters, and digital to analog converters.

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40. The system of claim 36, wherein the rise time circuit comprises one or more current sources, pulse width modulators, variable resistance elements, variable capacitance elements, digital devices, analog to digital converters, and digital to analog converters.

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41. The system of claim 36, further comprising:
wherein the lowpass filter comprises passive or active components.

42. The system of claim 36, wherein the conversion device comprises one or more analog to digital converters, digital to analog converters, current sources, variable resistance elements, variable capacitive elements, and active and passive components.

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43. The system of claim 36, wherein the controller comprises a processor.

44. The system of claim 36, wherein the controller is capable of storing and manipulating fall time and rise time calibration data.

45. The system of claim 36, wherein either interface circuit comprises one or more digital to analog converters, analog to digital converters, current sources, variable resistance elements, and variable capacitive elements.